

REMARKS

Claims 1-11 are pending in the present application and are rejected. Claims 1-11 are herein amended.

Preliminary Comments

Applicants herein amend claims 1-11. These amendments improve antecedent basis and clarity of the claims.

Applicants' Response to Claim Rejections under 35 U.S.C. §102

Claims 1-4 and 6-8 were rejected under 35 U.S.C. §102(b) as being anticipated by Ohira (U.S. Patent Application Publication No. 2002/0112711).

It is the position of the Office Action that Ohira discloses the embodiments as claimed. Ohira is directed at a control system for an ignition system. As illustrated in Figure 1, the system of Ohira includes a rotor 11 from which teeth 20-25 project, and a sensor 30. The rotor includes one long tooth 20, and five regular teeth 21, 22, 23, 24 and 25. The teeth are each positioned X° from a top dead center (TDC) position of a cylinder. It is noted that the ignition system of Ohira is designed for a three-cylinder, two-stroke engine. Since it is a two-stroke engine, it is reversible. As illustrated in Figure 1, in the normal direction, a trailing edge of long tooth 20 is disposed X° in front of the TDC position for cylinder 1, while a leading edge of tooth 21 is disposed X° behind the TDC position for cylinder 1. In the reverse direction, a trailing edge of tooth 21 is disposed X° in front of the TDC position for cylinder 1, while a leading edge of long

tooth 20 is disposed X° behind the TDC position for cylinder 1. Similarly, in the normal direction, a trailing edge of tooth 22 is disposed X° in front of the TDC position for cylinder 2, while a leading edge of tooth 23 is disposed X° behind the TDC position for cylinder 2. In the reverse direction, a trailing edge of tooth 23 is disposed X° in front of the TDC position for cylinder 2, while a leading edge of tooth 22 is disposed X° behind the TDC position for cylinder 2. The TDC positions are disposed 120° from each other. Thus, teeth 21 and 22 are disposed 120° minus $2X^\circ$ from each other, while teeth 22 and 23 are disposed $2X^\circ$ from each other.

The Office Action interprets Ohira such that teeth 20, 22 and 24 are the detection portions. The trailing edges (in the “normal” direction) of teeth 20, 22 and 24 are equally spaced 120° from each other. The Office Action does not include teeth 21, 23 and 25 in the analysis, and concludes that Ohira anticipates claim 1. In response, Applicants herein amend claim 1 to require that all of teeth 20, 21, 22, 23, 24 and 25 are included in the analysis. If all of teeth 20, 21, 22, 23, 24 and 25 are included as “detection portions,” Ohira cannot disclose or suggest the embodiment as claimed, these teeth are not detected “at equivalent angle intervals.” Therefore, Applicants herein amend claim 1 in order to recite “a rotor rotated in association with a crank shaft of an internal combustion engine and including projections, every projection on said rotor being one of a plurality of detection portions to be detected at equivalent angle intervals on the outer circumference of said rotor.” Since amended claim 1 recites that every projection is a detection portion, all of teeth 20, 21, 22, 23, 24 and 25 of Ohira must be included in the analysis. As discussed above, these teeth are not disclosed to be detected at equivalent angle intervals. For example, in the “normal” rotation direction, the distance between the trailing edge of tooth 20

and the trailing edge of tooth 21 is $2X^\circ$ plus the length of tooth 21. The distance between the trailing edge of tooth 21 and the trailing edge of tooth 22 is 120° minus $2X^\circ$ minus the length of tooth 21. Therefore, for at least this reason, Applicants respectfully submit that Ohira does not disclose or suggest the embodiment of proposed amended claim 1.

Furthermore, Applicants respectfully submit that Ohira does not disclose the subject matter of claim 4 for similar reasons, since Ohira does not disclose that “respective rear end positions of said plurality of detection portions are located at equivalent angle intervals in the rotating direction of said rotor.” Additionally, Applicants respectfully submit that claims 2 and 3 are patentable at least due to their dependency on claim 1, which Applicants submit is patentable for at least the reasons discussed above.

As to claims 6 and 7, the Office Action cites paragraph [0007] of Ohira to show the controlling the spark discharge, as claimed. However, Applicants respectfully submit that this passage merely refers to a prior art device, not the device of Ohira. Even if, *arguendo*, paragraph [0007] disclosed this subject matter, this would be insufficient to establish anticipation. “Because the hallmark of anticipation is prior invention, the prior art reference—in order to anticipate under 35 U.S.C. § 102—must not only disclose all elements of the claim within the four corners of the document, but must also disclose those elements “arranged as in the claim.”” *NetMoneyIn v. Verisign*, Fed. Cir. 2008. In other words, combining the inventive embodiment of Ohira and the prior art discussed in Ohira is not appropriate in a §102 rejection.

Additionally, Applicants respectfully submit that paragraph [0007] does not refer to the start-up period of the engine. As such, Applicants respectfully submit that Ohira does not

disclose or suggest the embodiment of claim 6. As to claim 7, the Office Action does not identify where Ohira discloses controlling the electrical supply timing. As such, Applicants respectfully submit that that Ohira does not disclose or suggest the embodiment of claim 7.

As to claim 8, the Office Action refers to the rejection of claims 1-4. Applicants herein amend claim 8 in a manner similar to amended claim 1. Accordingly, for reasons similar to claim 1, discussed above, Applicants respectfully submit that that Ohira does not disclose or suggest the embodiment of claim 8. Favorable reconsideration is respectfully requested.

Applicants' Response to Claim Rejections under 35 U.S.C. §103

Claims 5, 9 and 10 were rejected under 35 U.S.C. §103(a) as being unpatentable over Ohira.

With respect to claim 5, it is the position of the Office Action that Ohira discloses the embodiments as claimed, with the exception of disclosing that the rear ends of the detection portions are located at 15° intervals. The Office Action alleges that this would have been obvious. On page 4, the Office Action alleges that “[a] crank angle sensor that is more “full” of detection portions, lacking only one or two detection portions to provide for a reference area, is well known in the art.” The Office Action alleges that it would have been obvious to add more teeth to the rotor of Ohira, since discovering an optimum value of a result-effective variable involves only routine skill in the art.

In response, Applicants respectfully submit that the rejection of claim 5 is improper for several reasons. First, the Office Action only makes a general allegation regarding hypothetical art, which is not cited or applied in the rejection. Applicants respectfully submit that that if the

Office relies on art including a configuration having “[a] crank angle sensor that is more “full” of detection portions, lacking only one or two detection portions to provide for a reference area” to illustrate the obviousness of claim 5, that this art should formally cited and applied.

Next, Applicants respectfully submit that the Office Action’s reasoning regarding optimizing values is improper. The cited art does not disclose or suggest that the distance between rear end portions of teeth is a range to be optimized. Furthermore, there is no showing that the distances between rear end portions of teeth was a known results-effective variable. Finally, Applicants respectfully submit that Ohira itself teaches away from the proposed modification. As discussed in paragraph [0051], having only two teeth for each cylinder allows for a reduction in the number of parts to be used, thus lowering costs. Thus, adding more teeth, as suggested by the Office Action, would be contrary to the teachings of Ohira.

As to claims 9 and 10, Applicants respectfully submit that these claims are patentable at least due to their direct or indirect dependency on the independent claims. Favorable reconsideration is respectfully requested.

Claim 11 was rejected under 35 U.S.C. §103(a) as being unpatentable over Ohira in view of Namari ‘825 (U.S. Patent Application No. 2002/0026825).

It is the position of the Office Action that Ohira discloses the embodiment as claimed, with the exception of how the values are obtained (see bolded passages on pages 5 and 6 of Office Action). The Office Action relies on Namari ‘825 to provide this teaching, citing paragraphs [0050]-[0052] and Figure 7.

Namari '825 is directed at a stroke discriminator for an internal combustion engine. As illustrated in Figure 2, Namari '825 discloses a series of magnetic projections 52a, 52b, etc in a formed region, and no magnetic projections in a non-formed region. When detected by sensor 16, these magnetic projections are translated into a series of pulse signals, as illustrated in Figures 4 and 6A-C. Namari only discloses positive pulses, and does not include negative pulses. The intervals between pulses are referred to as "TM1" and "TM2" for example. As illustrated in Figure 7, and discussed in the corresponding text, a calculation is done to determine if TM2/TM1 is greater than a first predetermined value. For example, the first predetermined value is 2.5. See paragraph [0055]. If not, then F_LONG_PC is set to zero, indicating that a non-formed region has not been previously detected. If yes, then it is calculated whether TM3/TM1 is greater than a second predetermined value. For example, the second predetermined value is 1.5. See paragraph [0058]. Regardless of whether the answer is yes or no, it is determined that a non-formed region has been previously detected.

In response, Applicants respectfully submit that Namari does not disclose or suggest the subject matter alleged by the Office Action. First, Namari does not disclose or suggest dividing the intervals between negative pulses by the intervals between positive pulses. Namari only discloses positive pulses. Additionally, Namari does not disclose comparing this value to a value of one. Rather, in Namari, the first predetermined value is disclosed to be 2.5, for example, while the second predetermined value is disclosed to be 1.5, for example. Finally, this calculation is only used to determine whether or not a non-formed region has been previously detected. Namari does not disclose instructing electrical supply to the ignition coil or instructing

spark discharge based on the determination of whether or not a non-formed region has been previously detected. Therefore, for at least the above reasons, Applicants respectfully submit that the combination of Ohira and Namari does not disclose or suggest the embodiment as recited by claim 11. Favorable reconsideration is respectfully requested.

Applicants' Response to Double Patenting Rejections

Claims 1-11 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-16 of Namari '407 (U.S. Patent No. 7,360,407).

The Office Action states that although the conflicting claims are not identical, they are not patentably distinct from each other because both claim a crank angle sensor with associated method for determining spark timing based on ratios of between adjacent detection portions around the circumference of a rotor where one detection member is longer than the others.

In response, Applicants respectfully submit that Namari '407 does not claim that the selected detection portion is located immediately before a position corresponding to top dead center position. Applicants respectfully submit that this feature is sufficient to make the claims patentably distinct over Namari '407.

Additionally, Namari '407 does not claim the subject matter of claim 5. Namari '407 also does not claim an ignition control means as in claim 6 or the subject matter of the "wherein" clause of claim 6. Namari '407 also does not claim the subject matter of claim 7. Namari '407 also does not claim the positive and negative pulses of claim 9. Namari '407 also does not claim

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the discriminating based on the ratio of intervals between positive and negative pulses, as recited in claim 10. Finally, Namari '407 does not claim the subject of claim 11.

In response, Applicants respectfully submit that due to the above differences between the claims, the double-patenting rejection should be withdrawn. Favorable reconsideration is respectfully requested.

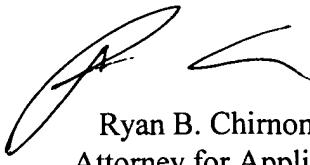
For at least the foregoing reasons, the claimed invention distinguishes over the cited art and defines patentable subject matter. Favorable reconsideration is earnestly solicited.

Should the Examiner deem that any further action by applicants would be desirable to place the application in condition for allowance, the Examiner is encouraged to telephone applicants' undersigned attorney.

If this paper is not timely filed, Applicants respectfully petition for an appropriate extension of time. The fees for such an extension or any other fees that may be due with respect to this paper may be charged to Deposit Account No. 50-2866.

Respectfully submitted,

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